

not return, the Diamond must after many rubbings decay and be wasted: but we have no reason to suspect the latter, especially if we consider the exceeding difficulty that is found in cutting or wearing away a Diamond. And a Circular motion of the parts is much more improbable, since, if that were granted, and they be suppos'd irregular and Angular parts, I see not how the parts of the Diamond should hold so firmly together, or remain in the same sensible dimensions, which yet they do. Next, if they be *Globular*, and mov'd only with a *turbinated* motion, I know not any cause that can impress that motion upon the *pellucid medium*, which yet is done. Thirdly, any other *irregular* motion of the parts one amongst another, must necessarily make the body of a fluid consistence, from which it is far enough. It must therefore be a *Vibrating* motion.

And Thirdly, That it is a very *short vibrating motion*, I think the instances drawn from the shining of Diamonds will also make probable. For a Diamond being the hardest body we yet know in the World, and consequently the least apt to yield or bend, must consequently also have its *vibrations* exceeding short.

And these, I think, are the three principal proprieties of a motion, requisite to produce the effect call'd Light in the Object.

The next thing we are to consider, is the way or manner of the *trajection* of this motion through the interpos'd pellucid body to the eye: And here it will be easily granted,

First, That it must be a body *susceptible* and *impartible* of this motion that will deserve the name of a Transparent. And next, that the parts of such a body must be *Homogeneous*, or of the same kind. Thirdly, that the constitution and motion of the parts must be such, that the appulse of the luminous body may be communicated or propagated through it to the greatest imaginable distance in the least imaginable time; though I see no reason to affirm, that it must be in an instant: For I know not any one Experiment or observation that does prove it. And, whereas it may be objected, That we see the Sun risen at the very instant when it is above the sensible Horizon, and that we see a Star hidden by the body of the Moon at the same instant, when the Star, the Moon, and our Eye are all in the same line; and the like Observations, or rather suppositions, may be urg'd. I have this to answer, That I can as easily deny as they affirm; for I would fain know by what means any one can be assured any more of the Affirmative, than I of the Negative. If indeed the propagation were very slow, 'tis possible something might be discovered by Eclipses of the Moon; but though we should grant the progress of the light from the Earth to the Moon, and from the Moon back to the Earth again to be full two Minutes in performing, I know not any possible means to discover it; nay, there may be some instances perhaps of Horizontal Eclipses that may seem very much to favour this supposition of the slower progression of Light then most imagine. And the like may be said of the Eclipses of the Sun, &c. But of this only by the by. Fourthly, That the motion is propagated every way through an *Homogeneous*

*medium* by direct or straight lines extended every way like Rays from the center of a Sphere. Fifthly, in an *Homogeneous medium* this motion is propagated every way with *equal velocity*, whence necessarily every pulse or vibration of the luminous body will generate a Sphere, which will continually increase, and grow bigger, just after the same manner (though indefinitely swifter) as the waves or rings on the surface of the water do swell into bigger and bigger circles about a point of it, where; by the sinking of a Stone the motion was begun, whence it necessarily follows, that all the parts of these Spheres undulated through an *Homogeneous medium* cut the Rays at right angles.

But because all transparent *mediums* are not *Homogeneous* to one another, therefore we will next examine how this pulse or motion will be propagated through differing transparent *mediums*. And here, according to the most acute and excellent Philosopher *Des Cartes*, I suppose the sign of the angle of inclination in the first *medium* to be to the sign of refraction in the second. As the density of the first, to the density of the second. By density, I mean not the density in respect of gravity (with which the refractions or transparency of *mediums* hold no proportion) but in respect onely to the *trajection* of the Rays of light, in which respect they only differ in this; that the one propagates the pulse more easily and weakly, the other more slowly, but more strongly. But as for the pulses themselves, they will by the refraction acquire another propriety, which we shall now endeavour to explicate.

We will suppose therefore in the first Figure A C F D to be a physical Ray, or A B C and D E F to be two Mathematical Rays, *trajected* from a very remote point of a luminous body through an *Homogeneous* transparent *medium* L L L, and D A, E B, F C, to be small portions of the orbicular impulses which must therefore cut the Rays at right angles; these Rays meeting with the plain surface N O of a *medium* that yields an easier *transitus* to the propagation of light, and falling *obliquely* on it, they will in the *medium* M M M be refracted towards the perpendicular of the surface. And because this *medium* is more easily *trajected* then the former by a third, therefore the point C of the orbicular pulse F C will be mov'd to H four spaces in the same time that F the other end of it is mov'd to G three spaces, therefore the whole refracted pulse G H shall be *oblique* to the refracted Rays C H K and G I; and the angle G H C shall be an acute, and so much the more acute by how much the greater the refraction be, then which nothing is more evident, for the sign of the inclination is to be the sign of refraction as G F to T C the distance between the point C and the perpendicular from G on C K, which being as four to three, H C being longer then G F is longer also then T C, therefore the angle G H C is less than G T C. So that henceforth the parts of the pulses G H and I K are mov'd ascew, or cut the Rays at *oblique* angles.

It is not my business in this place to set down the reasons why this or that body should impede the Rays more, others less: as why Water should transmit the Rays more easily, though more weakly than air. Onely thus

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